JAPAN

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JIS B 6517 (1989) (English): Test methods for performance and accuracy of single spindle wood boring machines

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The citizens of a nation must honor the laws of the land.

Fukuzawa Yukichi

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JAPANESE INDUSTRIAL STANDARD

Test Methods for Performance and Accuracy of Single Spindle Wood Boring Machines

JIS B 6517—1989

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In the event of any doubt arising,
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JAPANESE INDUSTRIAL STANDARD J I S

Test Methods for Performance and Accuracy of Single Spindle Wood Boring Machines

B 6517-1989

1. Scope

This Japanese Industrial Standard specifies the test methods related to the functions, running performances and rigidities and the methods of inspection on the static accuracies and machining accuracies for the wood boring machines specifies in the No. 6511 of JIS B 0114 of 600 mm or under in swing and 500 mm or under in the maximum distance from the spindle end to the table face.

Remark: The units and numerical values given in { } in this Standard are in accordance with the conventional units, and are appended for informative reference.

2. Methods for Functional Tests

The functional test for the wood boring machines shall be in accordance with Table 1.

Applicable Standards:

JIS B 0114-Glossary of Terms for Wood Working Machinery

JIS B 6507-General Code of Safety for Wood Working Machinery

JIS B 6521-Methods of Measurement for Noise Emitted by Wood Working Machinery

Corresponding International Standard:

ISO 7945-Woodworking machines - Single spindle boring machines - Nomenclature and acceptance conditions

Reference Standards:

JIS B 6501-Test Code for Performance and Accuracy of Wood Working Machinery

JIS Z 8203-SI Units and the Use of their Multiples and of Certain other Units

Table 1. Functional Tests

No.	Test item	Test method
1	Electric apparatus	Before and after the running test, examine the insulating condition once each.
2	Start, stop and running operation of spindle	At an appropriate spindle speed of rotation, carry out 10 times of start and stop continuously to examine the smoothness and reliability of actions.
3	Changing operation of spindle speed of rotation	Change the spindle speed of rotation over entire marked speeds of rotation to examine the smoothness of the actions and the reliability of indications of the operating device.
4	Changing operation of feeds	Change the feeds over entire marked feeds to examine the smoothness of workings and the reliability of indications of the operating device.
5	Operation of manual feed	Using the manual feed handle, examine the smoothness and the uniformity of workings throughout the overall length of the motion, and rotate the micromove feed handle several times to examine the smoothness and uniformity.
6	Ascending and descending and clamping operations of spindle head and operation of automatic stopping device	Allow the spindle head to ascend and descend to examine the smoothness and uniformity of workings throughout overall length of the motion, and examine the reliability of clamping and the smoothness of the workings of the clamping device, at the both ends and centre of the motion. In addition, examine the smoothness and reliability of the workings of the automatic stopping device.
7	Ascending and descending and clamping operations of table	Ascend and descend the table to examine the smoothness and uniformity of workings over the entire length of the motion. In addition, at the both ends and centre of movement, examine the reliability of clamping and the smoothness of workings of clamping device.
8	Mounting and dismounting of tool	Examine the reliability and smoothness of mounting and dismounting of tool and clamping screw.
9	Mounting and dismounting of workpiece	Examine the reliability and smoothness of mounting and dismounting of workpiece.
10	Safety device	Examine the reliability of safety functions for workers and protecting functions for machine (see JIS B 6507).
11	Lubricating device	Examine the reliability of such functions as oil tightness and proper distribution of quantity of oil.

Table 1. (Continued)

No.	Test item	Test method
12	Oil hydraulic apparatus	Examine the reliability of such functions as oil tightness and pressure regulation.
13	Pneumatic apparatus	Examine the reliability of such functions as air tightness and pressure regulation.
14	Accessories	Examine the reliability of functions.

Remark: For those wood boring machines which are not provided with some functions concerned, the equivalent test items given in Table 1 shall be omitted.

3. Methods for Running Tests

3.1 Noload Running Test Rotate the spindle, continue running for 30 to 60 min, measure the required electric power and noise after the bearing temperature has been stabilized, and record respective items specified in the Record Format 1 of Table 2. In parallel with this, observe by sense of touch that no abnormal vibration exists.

Furthermore, the measurement of noise shall be in accordance with JIS B 6521.

Table 2. Record Format 1

No.	Time of measurement o'clock, minute	Speed of rotation of spindle min^{-1} {rpm}		Temperature °C			Required electric power			Noise dB (A)	Description
				Spindle bearing		Room temperature	Voltage V	Current A	Input kW		
		Marking	Actual measurement	Upper	Lower						

Remarks 1. For a machine which is provided with the speed change apparatus for speed of rotation of spindle, it shall be recorded in respect to the speed of rotation of at least two levels, including the maximum speed of rotation.

2. For measuring conditions of noises, these shall be recorded in the description column.

3.2 Load Running Test Carry out boring on a test material, measure the required electric power and noises, and record respective items specified in Record Format 2 of Table 3. In parallel with this, observe by sense of touch that no abnormal vibration exists and the conditions of cut face.

The measurement of the required electric power shall be carried out by changing the diameter of the drill at a constant feed speed, or by changing the feed speed at a constant drill diameter.

Table 3. Record Format 2

No.	Test material					Tool							Cutting conditions				Required electric power							
	Dimensions			Kind of tree or type of wood	Water content	Diameter	Length	Length of cutting part	Shank diameter	No. of knife	Shape of knife	Material of cutting edge	Speed of rotation of spindle	Peripheral speed of tool	Feed speed	Bored depth	Voltage	Current	Input		Cutting power	Noise	Description
	Length	Width	Thickness																No load	Load			
	mm	mm	mm		%	mm	mm	mm	mm				min^{-1} {rpm}	m/min	m/min	mm	V	A	P_0 kW	P_1 kW	$P_1 - P_0$ kW	dB (A)	
											Appended otherwise													

Remarks 1. Regarding the noise measuring conditions, these shall be recorded in the description column.

2. The knife shape shall be given in Figure, and the main dimensions shall also be noted.

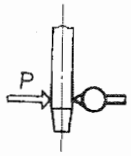
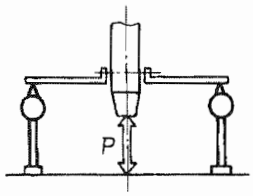
3. For that of the manual type, the required electric power may not be measured.

4. The bored depth shall be 30 mm or over.

4. Methods of Rigidity Test

The rigidity test of the wood boring machine shall be in accordance with Table 4.

Table 4. Rigidity Tests

No.	Test item	Measuring method	Figure for measuring method
1	Flexural rigidity of spindle system	Apply a fixed test indicator to the end portion (side face) of the spindle, apply a load (P) confronting with the former in horizontal direction(1), and measure the deflection of the spindle. Carry out this measurement each in left and right direction and front and rear direction.	
2	Overall rigidity of spindle and table	Measure the change of relative displacement between the spindle and the upper face of table, in respect to left and right and front and rear directions, when a load (P) has been applied in vertical direction between the spindle(2) and the table.	

Notes (1) The place where the load (P) is to be applied should be the nearer place from the spindle end as far as possible, and the distance from the spindle end is to be recorded.

(2) For that of which spindle head or spindle sleeve performs ascending and descending motion, measurement shall be carried out with fixing it at the centre of its travel.

Remarks 1. For the rigidity test of the machines of the same design, allow the test results obtained from a representative set to represent these, and others may be exempted from testings.

2. For the magnitude of the load (P), a recommended load (P) by the manufacturer shall be applied to measure, and this load (P) shall be recorded.

3. This measurement shall be carried out after the bearing temperature has been stabilized, while rotating the spindle.

5. Methods for Static Accuracy Inspection

The static accuracies of the wood boring machine shall be in accordance with Table 5.

Table 5. Static Accuracy Inspections

Unit: mm

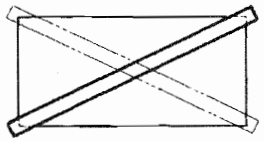
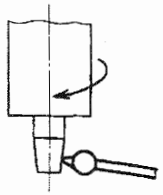
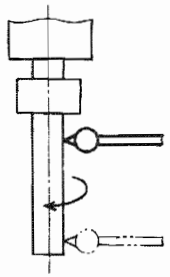
No.	Inspection item	Measuring method	Figure for measuring method	Permissible value
1	Straightness of upper face of table	Place the straightedge(3) of 500 mm on diagonal lines of the upper face of the table, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.05 per 500
2	Runout of spindle	Apply a test indicator to the chuck part of the spindle, rotate the spindle manually, and consider the maximum difference of readings of the test indicator during rotation to be the measured value.		0.03
3	Runout of chuck	Mount a test bar to the chuck, apply a test indicator to its root and end, rotate the spindle manually, and consider the maximum difference of the readings of the test indicator during rotation to be the measured value.		0.12 at the root of test bar 0.14 at the position of 100 from the root of test bar

Table 5. (Continued)

Unit:mm

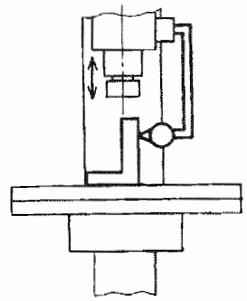
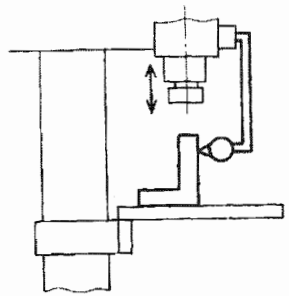
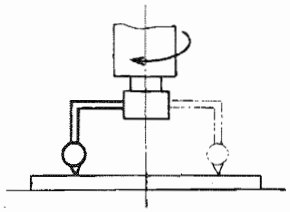
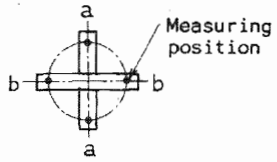
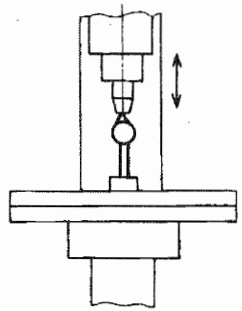
No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
4	Perpendicularity of up and down motion of spindle with reference to upper face of table	Left and right direction	Stand a square(4) on the upper face of the table, apply a fixed test indicator to the spindle head, travel the spindle vertically, and consider the maximum difference of readings of the test indicator to be the measured value(5).		0.05 per 100
		Front and rear direction			0.05 per 100

Table 5. (Continued)

Unit: mm

No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
5	Perpendicularity of center line of spindle to upper face of table	Left and right direction	Place a square on the upper face of the table in the left and right and front and rear directions, apply a fixed test indicator to the main spindle, swing it 180°, and consider the maximum difference of readings of the indicator to be the measured value(5).		0.10 per swinging diameter of 300
		Front and rear direction			0.10 per swinging diameter of 300
6	Movement of axial direction of spindle		Fix a test indicator on the upper face of the table, apply the end face of the spindle to this, shake the spindle in the axial direction(6), and consider the maximum difference of readings of the test indicator to be the measured value.		0.04

Notes (3) In the case where the measuring distance is smaller than the reference, the numerical value of permissible value of measurement shall be converted in proportion to distance.

Notes (4) The square shall be placed at the centre of the left and right or front and rear of the table.

(5) In taking the readings, knees shall be fastened firmly.

(6) The force to shake the spindle in axial direction shall be approx. 150 N {approx. 15 kgf}.

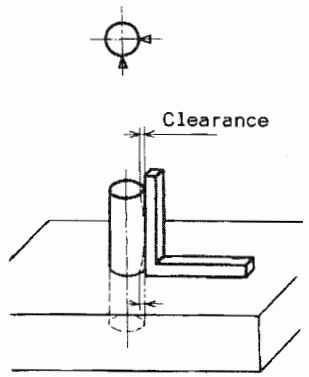
Remark: For those wood boring machines which are not provided with some functions concerned, the equivalent test items given in Table 5 shall be omitted.

6. Methods for Machining Accuracy Inspection

The machining accuracy inspection of the wood boring machine shall be in accordance with Table 6.

Table 6. Machining Accuracy Inspection

Unit: mm

No.	Inspection item		Measuring method	Figure for measuring method	Permissible value
1	Perpendicularity of drilled hole	Left and right direction	After the test material of approximately 50 mm in thickness has been through-hole-processed with a 12 mm drill, insert a test bar, apply a square which has been stood on the upper face of the test material to the test bar face in the left and right and front and rear directions, measure clearances with a feeler gauge, and consider the maximum value to be the measured value.		0.10 per 50
		Front and rear direction			0.10 per 50

Remark: The test material shall be subjected to necessary pre-processing in advance.

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Japanese Text

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